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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/899,872	07/05/2001	Enrico Griseri	CISCP690	6618

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RITTER, LANG & KAPLAN
12930 SARATOGA AE. SUITE D1
SARATOGA, CA 95070

EXAMINER

SOMMER, ANDREW R

ART UNIT	PAPER NUMBER
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3663

DATE MAILED: 02/24/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/899,872

Applicant(s)

GRISERI ET AL.

Examiner

Andrew R Sommer

Art Unit

3663

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 February 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2,4-7,9-12,15-17,19-22 and 24-27 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

- 5) ☐ Claim(s) _____ is/are allowed.

- 6) ☒ Claim(s) 2,4-7,9-12,15-17,19-22 and 24-27 is/are rejected.

- 7) ☐ Claim(s) _____ is/are objected to.

- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 July 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 04 February 2003 is: a) ☒ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 7.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

The Examiner has considered all references listed on the IDS, Paper No. 7, submitted 04 February 2003. A copy of the form PTO-1449 or its equivalent with the Examiner's initials accompanies this action.

Drawings

The proposed drawing correction and/or the proposed substitute sheets of drawings, filed on 04 February 2003 have been approved. A proper drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The correction to the drawings will not be held in abeyance.

Claim Objections

Claim 16 is objected to because of the following informalities: Claim 16 is dependent on cancelled claim 14, which is improper. Appropriate correction is required.

Specification

The disclosure is objected to because of the following informalities: The newly added amendment, requesting that the provisional be placed as an appendix after the claims, is objected to. There are no provisions which allow an applicant to place anything other than a gene sequence listing or computer programmable code after the claims. Therefore, Applicant lacks authority for making such a modification. If Applicant

Art Unit: 3663

wishes to provide the Examiner with authority for such a modification to the specification, this objection may be withdrawn. Alternatively, Applicant is invited to modify the actual text of the specification to incorporate the information contained in the provisional.

Appropriate correction is required.

Claims 5, 6, 20, 21, 25, and 26 rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for the particular embodiment shown in Fig. 2, does not reasonably provide enablement for all particular Raman amplifiers using a variety of fiber types. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make or use the invention commensurate in scope with these claims. Particularly, the specification discloses, in Fig. 2 and at pages 9-11 a Raman amplifier and a method for determining a ratio of forward to backward pumped gain for a particular fiber. As the specification discloses, this is based on some critical assumptions. First of all, "Fig. 2 assumes a dispersion value of $D=4.185$ ps/nm/km at the relevant wavelengths and an effective area, $A_{\text{eff}}=55\mu\text{m}^2$." Detailed Description at page 9, lines 15 and 16. Furthermore, the Raman amplifier has a gain budgeted for 15 dB. *Id.* at lines 17-18. Applicant then discloses that the 0.5 dB of gain saturation is the maximum tolerable level of saturation for the Raman amplifier. By using all of this information, Applicant then produces the plot in Fig. 2. Applicant then describes how it is possible to determine the first gain level which is responsive to a minimum tolerable four-wave-mixing product suppression level

Art Unit: 3663

and a desired signal to noise ratio, as claimed. However, this is specific for the plot in Fig. 2.

Nowhere does applicant describe how to deal with changes in these assumptions. Suppose that the dispersion value or the effective area of the fiber was changed. As appreciated by one with ordinary skill in the art this would inherently change the third-order non-linearity of the fiber (i.e., the X^3 of the fiber) and would impact the Raman gain coefficient of the fiber. Therefore, the plot shown in Fig. 2 would be a different curve. Applicant does not address this at all, and has not enabled one with ordinary skill in the art to exercise this invention with any fiber other than the specific fiber assumed in the previous discussion, as well as the assumed gain saturation. Therefore, the results from altering the disclosed invention to a general fiber without these properties is unpredictable and would involve undue experimentation and calculation on the part of the ordinarily skilled artisan.

The Examiner has a few questions that may clarify the issues raised above:

- How does one with ordinary skill in the art arrive at the solid contour?
- What effect do the assumed variables have on the shape of the curve in figure 2?
- How may the plot in Fig. 2 be derived by the physics and mathematical equations in the provisional?
- Where does the suggestion in the provisional to make a plot resembling Fig. 2? After reviewing the Provisional Application, the Examiner has found a lack of any suggestion or teaching of the limitations of the

aforementioned claims. Where is this teaching? How does the provisional provide enablement for these claims?

- Will the type of fiber, say from a True-Wave-RS to a DSF alter the plot? If so, what effect will it have on the plot? The provisional does not suggest this. Furthermore, the provisional lacks any example calculations, much in the same way that the Section 111(a) application lacks such a teaching.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 16 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 16 is indefinite because it is dependent on claim 14, which has been cancelled by amendment. See Paper No. 4. Therefore, one of ordinary skill in the art could not interpret what this claim is limited to.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

Claim 2 is rejected under 35 U.S.C. 102(e) as being anticipated by Ackerman et al. ('963) (hereafter "Ackerman").

Regarding claim 2, Ackerman teaches an optical communication system, which includes an apparatus for amplifying an optical signal, comprising: (1) a fiber (see column 1, line 23); (2) an optical pump energy source disposed to inject optical pump energy into said fiber in a co-propagating direction relative to a transmission direction of an optical signal in said fiber to cause Raman amplification of said signal in accordance with a gain level (see column 3, line 65 to column 4, line 4); and (3) wherein said gain level is greater than 4 dB (see column 5, lines 47-48; column 7, line 7). While Ackerman does not explicitly teach that for a selected signal to noise ratio there is a greater four-wave mixing product than would be achieved using only a counter-propagating optical pump energy. Ackerman inherently teaches that when given a signal to noise ratio, there is a greater four-wave-mixing product suppression level than would be achieved using only a counterpropagating optical pump energy source to obtain said gain level. The inherency stems from the fact that the only requirements for this to occur is that there be a co-propagating Raman pump imparting a gain of greater than 4 dB to the optical signals amplified therein. The claim requires (and in fact the Application, considered as a whole teaches) that the only things necessary to achieve the claimed result is a fiber, a co-propagating pump source, which imparts a gain of greater than 4dB. Thus, the "beneficial" (see Paper No. 4 at 22) four wave mixing product suppression is latent, ergo inherent in the apparatus of Ackerman, as Ackerman discloses all of the components and values claimed.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 4, 11-12, 15-17, 19, 22, 24 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cornwell, Jr. et al. ('383) (hereafter "Cornwell") in view of Ackerman.

Regarding claims 4, 15, 19, and 24, Cornwell teaches an optical amplifier in a fiber-optic communications system, comprising: (1) a first optical pump energy source (Fig. 5, first set of sources (from left to right), 12, right-hand source) disposed to inject optical pump energy into a fiber (Fig. 5, 36) in a co-propagating direction relative to a transmission direction of said optical signal to cause Raman amplification of said signal in accordance with a first gain level (the first gain level is inherent, as the first optical pump energy source will impart Raman gain to the signal, as it is designed to impart said Raman gain and must therefore be above the SRS threshold for the fiber); (2) a second optical pump energy source (Fig. 5, second set of sources (from left to right), 12, left-hand source) disposed to inject optical pump energy into said fiber in a counter-propagating direction relative to said transmission direction of said optical signal to cause Raman amplification of said signal in accordance with a second gain level (inherent for the same reason that the first gain level was inherent), and wherein said

Art Unit: 3663

optical signal experiences a total gain level including a first gain and a second gain (this is also inherent because of the additive nature of net gain). Cornwell does not teach that the first gain level is greater than 4 dB. Ackerman teaches a first Raman pumping source (see the discussion of claim 1, above) that pumps a fiber so as to impart Raman gain on the optical signals that is greater than 4 dB. It would have been obvious to modify the Cornwell amplifier to include a first pumping source that yields a gain of greater than 4 dB because such is well known in the Raman amplifier art and presents an amplification system with numerous benefits, as described in column 3, lines 40-49 of the Ackerman patent.

Additionally, Cornwell does not teach that when given a signal to noise ratio, there is a greater four-wave-mixing (FWM) product suppression level than would be achieved using only said second optical pumping energy to obtain said total gain level. Ackerman inherently teaches that this is the case. The discussion of claim 2, above is hereby incorporated by reference to support the determination that Ackerman inherently exhibits such phenomena. It would have been obvious to modify the Cornwell reference to utilize the co-propagating Raman pumping system of Ackerman because of the numerous benefits to be obtained by such a modification such a reduced pump-signal cross-talk, which would have the inherent effect of yielding a beneficial FWM product. See Ackerman at column 3, lines 40-49.

Regarding claims 11 and 16, Cornwell teaches a Raman amplifier that comprises a fiber (Fig. 5, 36).

Regarding claims 12, 17, 22, and 27, Cornwell teaches an erbium-doped amplifier in cascade with the fiber. See particularly column 11, lines 22 to 32.

Claims 7, 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cornwell in view of Ackerman and Aoki (cited to show inherency).

Regarding claim 7, Cornwell does not teach that the second gain level is set responsive to said first gain level. This is an obvious modification to the Cornwell amplifier. First of all, it is well known that by increasing pump power the gain of the amplifier can be increased, which to a point, will increase the SNR of the amplifier and the amplifier gain. See *generally*, Aoki at 1227-28. It would have been obvious to modify the Cornwell amplifier to determine a total desired gain value, and set a second gain level in accordance with the first gain level because as is well known in the art, the total amplifier gain is a function of input pump power (*Id.*) and that by increasing the incident pump power (regardless of forward or backwards pumping) one would increase the gain of the amplifier to a desired gain, as would have been appreciated by one of ordinary skill in the art at the time of the invention by applicant.

Regarding claim 9, Cornwell inherently teaches that the first optical pump energy source is set in accordance with a first gain level. The purpose of using a Raman pump is to impart Raman gain on the optical signal, and by pumping above the SRS threshold; such gain is imparted to the optical signal. Cornwell inherently shows that the first pumping energy is set in accordance with a first gain because the first pump must be pumping above the SRS threshold (as it is intended to be a Raman amplifier).

Aoki illustrates the effects of forward pumping at various Raman pump powers to obtain a Raman gain, which shows that by pumping at a given pump level, the signal is amplified to first Raman gain level. See Fig. 4 of the Aoki article, at page 1227.

Regarding claim 10, see the discussion of claim 9.

Response to Applicant's Arguments

(1) Applicant's response to the objection to claims 11 and 16 under 37 C.F.R. 1.75 (c):

Applicant has overcome the objection under 1.75(c) with arguments.

(2) Applicant's Arguments in Response to the rejection under 35 U.S.C. 112 ¶ 1:

Applicant argues that claims 1-6, 20-21, and 25-26 are supported by the text at pages 9-11 and Figure 2, and they teach how to use only one embodiment of the invention. Applicant then asserts:

By using the analysis and equations in the appendix, one of ordinary skill in the art can derive the solid contour of Fig. 2 and can modify this contour to taken into account changes in parameters or changes in the type of the fiber. Paper No. 4 at page 21.

Looking to the Provisional application, one of ordinary skill in the art would find it unclear at best how to arrive at a modified Fig. 2 for a different type of fiber than the assumed fiber of the present application. There is no indication of the particular equations used to arrive at Fig. 2. Furthermore, there is no teaching of the claimed elements of claims 5-6, 20-21, and 25-26. As further evidence of this, there is no figure even slightly resembling Figure 2 in the provisional application. How could one of ordinary skill in the art look to the provisional application to find a teaching of something that, while may be derived from the myriad of equations therein, is not suggested by the provisional application itself? Why would one of ordinary skill in the art do this? And,

even a more relevant question is how would one of ordinary skill in the art perform this task with the minimal direction provided therein?

The Applicant has merely concluded that "one of ordinary skill in the art can derive" (Paper No. 4, at 21) (emphasis added) the plot of Figure 2. While it may be possible to "derive" Fig. 2 from the equations contained in the provisional, there is no suggestion or teaching of how this may be done. Therefore, the provisional application provides no further enablement for how to derive the contour of Fig. 2, which pursuant to the detailed description, is critical for using the invention of claims 5-6, 20-21, and 25-26.

Applicant's conclusion that the provisional enables one of ordinary skill in the art to make and use the invention is unpersuasive, as "[t]he arguments of counsel cannot take the place of evidence in the record." See MPEP § 716.01(c) (citing *In re Schulze*, 346 F.2d 600, 602, 145 USPQ 716, 718 (CCPA 1965)). Therefore, if Applicant still believes that the provisional is enabling, Applicant is invited to supply an affidavit under 37 C.F.R. § 1.132 describing how one of ordinary skill in the art could arrive at Fig. 2 without undue experimentation or derivation from the disclosure in the provisional application.

Therefore, viewing the evidence as a whole, and realizing that counsel's arguments are unpersuasive without evidence on the record, the Examiner maintains that the present application lacks an enabling teaching allowing one of ordinary skill in the art to use the entire invention embodied within the scope of claims 5-6, 20-21, and 25-26. See MPEP § 2164.05. The Examiner concludes that the Applicant has merely

Art Unit: 3663

enabled the fiber depicted in Fig. 2, which is described in the specification, but has failed to provide enablement for any other type of fiber that may be used as a Raman amplifier.

(3) Applicant's response to the 35 U.S.C. § 102(e) Rejection of claim 2 over Ackerman et al. ('963):

Applicant argues that Ackerman "fails to disclose or suggest any mention [sic] of beneficial four-wave-mixing suppression characteristics as required by claim 2, as amended." Paper No. 4, at 22. This statement is based on a misreading of the Examiner's rejection. The Examiner asserted that this feature was inherent in the Ackerman invention as all of the claimed components are taught in the claimed configuration. See Paper No. 3, at 10-11.

Even if Ackerman does not explicitly teach the "beneficial four wave mixing suppression characteristics" these characteristics are inherently present in the device disclosed by Ackerman. By issuing a patent on a latent property which is present in a prior art device, the patent "would remove from the public that which is in the public domain by virtue of its inclusion in, or obviousness from the prior art." *In re Oelrich*, 212 USPQ 323, 326 (CCPA 1981) (citing *In re Wiseman* 596 F.2d 1019, 201 USPQ 658 (CCPA 1979)). "It is true that mere recitation of a newly discovered function or property, inherently possessed by things in the prior art, does not distinguish a claim drawn to those things from the prior art." *In re Oelrich*, 212 USPQ at 326 (citing *In re Swinehart*, 58 CCPA 1027, 1031, 439 F.2d 210, 212-13, 169 USPQ 226, 229 (1971)). See also *In re Best*, 195 USPQ 403 (1977).

Further evidence from Applicant's own specification leads to the conclusion that patenting the aforementioned configuration would actually remove information from the public domain. Applicant has stated:

The inventors have discovered that such a configuration [having both co and counter propagating pump light] may achieve a better combination of four-wave-mixing product suppression and amplifier output signal to noise ratio than could be achieved with prior art systems employing a counter-propagating optical pump signal alone. Previously designers have either failed to take advantage of co-propagating pump energy or used insufficient co-propagating pump energy to realize the advantages attainable by embodiments of the present invention.
Specification at 7.

The Examiner has shown that Ackerman suffers from neither of the aforementioned deficiencies of the prior art, as Ackerman discloses both co-propagating pump light and sufficient pump energy to realize the advantages claimed. The pump energy used in Ackerman is enough to yield a gain of at least 4 dB, as claimed.

Thus, the Examiner believes that issuing a patent on the previously unnoticed latent properties present in the amplifier arrangement of Ackerman would remove from the public domain that which was inherent in a device known to the public. Cf. *In re Oelrich*, 212 USPQ at 326.

In conclusion, Applicant has failed to rebut, or even address the argument of inherency presented in the previous office action. Thus, the Examiner maintains his position that the prior art of Ackerman anticipates the invention of claim 2.

(4) Applicant's Arguments against the 35 U.S.C. § 103(a) Rejections of claims 3-4, 11-13, 15-19, 22-24, and 27:

Applicant presents arguments against the combination of Ackerman and Cornwell, Jr., as failing to teach the beneficial four-wave mixing effects claimed in Applicant's disclosure. This argument is rebutted in subsection (3), above, the discussion of which is hereby incorporated in its entirety. For the reasons expressed above, the Examiner submits that it would have been obvious to one of ordinary skill in the art at the time of invention by the Applicant to modify Cornwell, Jr. by combining the pumping arrangement of Ackerman with the apparatus of Cornwell, Jr., because of the beneficial effects achieved in the Ackerman pumping arrangement, which are well known in the art. See column 3, lines 40-49.

Applicant also argues that the effect presented by Applicant's is not well known. The Examiner concedes that the Ackerman disclosure fails to explicitly teach the beneficial effects to the four-wave mixing suppression level, however, this is inherent in the Ackerman disclosure, and thus, the device is well known in the art.

A similar argument is presented with respect to claims 7, 9 and 10. These arguments have been rebutted herein and further discussion would be duplicative and redundant.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

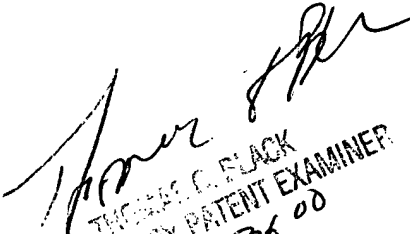
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew R Sommer whose telephone number is (703) 605-4274. The examiner can normally be reached on M - F 7:00 - 3:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Black can be reached on (703) 305-8233. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9326 for regular communications and (703) 872-9327 for After Final communications.

Art Unit: 3663

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1113.

ars
February 14, 2003


THOMAS C. BLACK
SUPERVISORY PATENT EXAMINER
GROUP 36 00